

**ABSTRACT**

A method for the detection and/or analysis of compounds which simultaneously exhibit nuclear quadrupolar resonance and nuclear magnetic resonance, said compounds comprising a spins A nuclei group capable of exhibiting a quadrupolar resonance; and a spins B nuclei group, capable of exhibiting a magnetic resonance, wherein said method comprises:

a) application of a first magnetic field  $H_1$  to said spins A nuclei group, said field  $H_1$  oscillating in the quadrupolar resonance frequency of said spins A nuclei group, and simultaneously on said spins B nuclei group, other second and third magnetic fields, said second magnetic field being a magnetic field  $H_0$  which is turned on in coincidence with the first pulse of said oscillating magnetic field  $H_1$ ; and said third magnetic field being a magnetic field  $H_2$  oscillating within the magnetic resonance frequency of said spins B nuclei group in said magnetic field  $H_0$ ;

b) turning off said second magnetic field  $H_0$  when the signal of quadrupolar resonance from said spins A nuclei group is maximal, so that the signal-to-noise ratio of said quadrupolar signal increases, thereby decreasing the minimum volume of the compound able to be detected and/or analyzed;

c) digitalizing and summing detected signals while  $H_0$  is off, in synchronism with excitation pulses sequence for  $H_1$ ;

d) turning on again magnetic field  $H_0$  once the

digitalization step ends;

e) repeating steps b) and d) until the adequate signal-to-noise ratio required to detect said compound is obtained; and

f) emission of an alarm signal in the case of a positive detection or to proceed to the detection and/or analysis of the following compound should the signal be negative.

More specifically, the method is related to the detection and/or analysis of compounds, particularly explosives, drugs, or the like, placed in different kind of containers, particularly luggage, mail, or the like.

A method for the detection and/or analysis of compounds which simultaneously exhibit nuclear quadrupolar resonance, sensor elements, and an arrangement for the detection and/or analysis of compounds which simultaneously exhibit double nuclear quadrupolar resonance or nuclear quadrupolar resonance and nuclear magnetic resonance are also disclosed.